

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF WATER

WASTEWATER DISCHARGE AUTHORIZATION PROGRAM

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Chuitna SSC proposal

Summary of discussion from 9/8/09 and 9/10/09 technical session
teleconferences and additional related comments post-teleconferences.

Present 9/8/09: ADEC – Kenwyn George, Pete McGee, Jim Powell, Richard
Heffern, Marc Bentley, Howard Teas.

ADNR- Ed Fogels, Russ Kirkham

ADF&G – Megan Marie

EPA – Hanh Shaw, Bill Beckwith, Cindi Godsey

USF&WS – Phil Johnson, Phil Brna, Mary Reeves

Present 9/10/09: ADEC – Kenwyn George, Pete McGee, Jim Powell, Richard
Heffern, Marc Bentley, Howard Teas.

ADNR- Ed Fogels, Russ Kirkham

ADF&G – Megan Marie

EPA – Hanh Shaw, Jamie Stoddard, Bill Beckwith, Cindi Godsey

USF&WS – Phil Johnson, Phil Brna

PacRim – Dan Graham

Tetra Tech – Jerry Diamond, Ron Rimelman, Henry Latimer

Medicine Bow Resources - Tim Reeves

Recalculation Methods

Question #1: How will PacRim collect species to know that they have
adequately characterized aquatic life present?

*PacRim/Tetra Tech response: There have been studies on the presence of algae,
macro invertebrates and fish since the 1980's, so there is a lot of data on what
exists in these river systems. There have also been two EIS studies that have
looked at this, one in the 80's and one in 200, and Oasis and LGC collected more
information recently. Both resident and transitory / migratory species will be
included.*

Question #2: Have there been any new data/criteria/organisms since the
criteria were first developed?

PacRim/Tetra Tech response: Tetra Tech would look at this and include any new species if both the state and EPA agreed. EPA has strict data quality requirements for inclusion within the list.

Question #3: How many sites and what areas are covered by the studies?

PacRim/Tetra Tech response: A summary can be provided to detail this, with data sources and a map, if possible, with the recalculation report. The recalculation is not just for the species tree and family, but also looks at habitat.

Water Effects Ratio

Question #1: Is the data collected at Site C141 within the area to be mined and on River 2003 truly representative of the varying conditions in the other two rivers, since the WER would apply also to Rivers 2002 and 2004?

Data sought from PacRim: Provide data as follows:

- 1) Historic sample data results for the various surface stations on all three rivers.
- 2) Describe how the samples were collected, i.e. were they grab or composite samples. If composite samples, over what time period was each composite sample and how many individual samples were taken to make the composite sample?
- 3) Graph the data to show variations in parameters at various times of the year, for say 10 years? These graphs are to include data for:
 - a) Al, Cu, Pb, Zn.
 - b) pH, DO, TSS, alkalinity, TOC, and temperature.
 - c) Flow

Commented [b1]: Hardness as well, maybe it was omitted by accident?

PacRim/Tetra Tech response: Hydrologic data has been collected back to the 1980's. See the document "Surface Water Baseline Report 2009Update.pdf". All rivers have been studied and the flow per unit drainage area is pretty much the same in all watersheds. The same is true for the topology and vegetation. There is some difference due to elevation and distance from the coast. Water quality is summarized in the document "Surface Water Baseline Report 2009Update.pdf". The Piper plot (figure 1) in the study plan shows the constituents of the waters in the three streams is very similar; there are not even any outliers. Metals values can be seen to be very similar. Site C141 is considered representative for the three rivers; it has the longest term for data collection and it is also within the mine site. Many of the parameters that could affect toxicity have been recorded at different stations. They are very similar at the different sites. Over 90% of the discharges are at or below the values at site C141. Data on parameters are well graphed in the hydrology report.

Question #2: What are the extents of the watershed areas to which the WER shall be applied? One assumes it will be from the highest point upstream on Rivers 2002 and 2004 affected by mine dewatering discharges, and from the discharge location on River 2003 just downstream of the mine boundary. It is also assumed that the SSC will not apply to any lakes within the watersheds.

1) Information sought from PacRim:

- 2) Is the assumption stated above correct?
- 3) Does PacRim have a downstream boundary to which they would want the SSC applied, e.g. would it be to the confluences of Rivers 2002, 2003 and 2004 with the Chuitna River, or would it include the Chuitna River all the way to Cook Inlet?
- 4) Does PacRim have details of where discharges may occur to the three rivers?

Question #3: Are there any species existing in any of the rivers that are not in the national data sets for the metals criteria in question on the EPA WER test list, and if so are they more sensitive than those on the EPA test lists? See USFWS comments.

PacRim/Tetra Tech response: See answer to Question 1 of "Recalculation Methods".

Question #4: Does data show sources, analytical sensitivity, detection limits and whether the data is validated?

PacRim/Tetra Tech response: Tetra Tech will only use more recent data; they are pretty sure this would have been validated; this is a common lab practice.

Question #5: The WER will change as the overburden is removed. TOC and probably other parameters will change. How will that be handled? (Teas)

Comment #1: The EPA WER guidance, Appendix F, Page 135 provides information on testing multiple metals. Tetra Tech's Response #21 to EPA's comment responses dated August 19, 2009 on this does not fully address the issue of synergistic effects, i.e. if all the metals are allowed to be at elevated levels, rather than only one metal at a time exceeding a WQS, then the protection provided by the National Criteria do not exist and there may be toxic effects when two or more metals exceed the WQS. This issue needs to be further commented upon or included in the plan.

Comment #2: If samples are not acidified in the field, as EPA now requires, then metals results can be skewed.

Commented [b2]: These questions concerning the site seem to be directed at the applicant/PacRim. The state should be considering the site definition as well, taking into consideration the project plan; the applicant's desires and input; and how the state would apply the criteria to ensure that waters within the site, and waters downstream of the site, will be protected.

PacRim/Tetra Tech response: Total metals are extremely low, so dissolved metals are also very low. All future sample collection will follow EPA protocols.

Comment #3: ADEC would like to see a QAPP for the sampling. There is a page on the DEC website on QAPP's. It would be good to have DEC sign off on the QAPP.

PacRim/Tetra Tech response: The QAPP is in development. There is a concern that it may take a month or more to get the necessary approval.

Comment #4: Water quality will change seasonally.

Comment from the agencies or Tetra Tech: Iron and manganese change with high turbidity, e.g. at breakup and during high storm events in the fall.

PacRim/Tetra Tech: Seasonality will not affect the WER because one is looking at the ratio between lab and site water; varying parameters other than metals will affect toxicity.

Comment #5: It would be good to know variability in pH and alkalinity seasonally. It would also be good to know differences between actual values and the values used when the criteria were set. It would be good to have these parameters plotted against flows. A site pH of less than 7 would be important for the laboratory aluminum test.

Commented [b3]: I believe this was meant to be site water aluminum test.

Comment #6: There are two distinct flow regimes, low flow and high flow that should be considered; also low flows and high flows should be compared in the summer and winter to see if they are similar in characteristics.

PacRim/Tetra Tech response: The fall (Sept/Oct/Nov) has both low and high flow periods (see Figure 1 in the study plan). That is why this period would be very good for collecting samples in both high and low periods. A minimum of three weeks would occur between high and low flow samples being collected. Sediments and TSS are normally higher during the "first flush" of a rain event; samples will not be taken at that time. A high flow sample can be taken shortly after a big storm event; peak flow do not occur until several hours after the main rainfall events have occurred; it takes 24-48 hours for the flows to subside.

Comment #7: Important parameters that can influence toxicity that and a WER are TSS, TOC (or preferably DOC if available), alkalinity, pH and hardness. Of less importance are temperature and DO. The parameters that are important to the Biotic Ligand model are the same as those that are important to a WER.

Criteria modification procedure for iron

PacRim/Tetra Tech: With iron you get floc form and high iron values. The EPA bioassessment technique is for clean sediment criteria. Tetra Tech will look at the iron concentration when you get effects. There are some 20 site with ion data; they will look at the stream biology at these different sites to see how it changes with different iron concentrations. The biology may be reacting and responding to something else, however Tetra Tech will assume it is iron to be conservative. Even though iron may vary at the different sites, the other parameters are very similar when it comes to the WER.

Comment #1: If fish are to be analyzed for iron then the life stage is very important.

Comment #2: A macro-invertebrate study would make more sense for site specific criteria.

Comment #3: Effects of iron on habitat should be looked at.

Comment #4: The conditional probabilities analysis as proposed in the study is not per EPA's recommendations. The State may need to find an independent expert to review the proposal. The following information is provided by Bill Beckwith, EPA (9/9/09):

Through communications with staff at EPA's National Center for Environmental Assessment and EPA's Health and Ecological Criteria Division at EPA I have learned that it is not accurate to say that Conditional Probability Analysis (CPA) is an EPA recommended approach for developing site-specific criteria for iron and nutrients.

Nevertheless EPA has found that empirical approaches using field data are appropriate for deriving criteria for such pollutants. There is a draft "Empirical Approaches for Nutrient Criteria Derivation" document scheduled for Science Advisory Board review this week (September 9-11, 2009) that can be accessed at the link below. CPA is presented in that document for use in data exploration, to screen variables for use in development of stressor-response relationships, and to estimate the proportion of water bodies currently meeting or not meeting a selected end point in a sample population of all water bodies with a pollutant concentration at or above one or more proposed candidate criteria. CPA is not recommended, however, as a method for establishing stressor-response relationships and associated numeric values that might be used as criteria. A comment was also made that the sample size of 22 is very small for such an analysis, and the sites are likely to be autocorrelated as they are from a single basin. I will try to follow-up on this given that the proposal is to develop criteria for a single basin.

The following points have also been made for criteria development:

- One or more individual endpoints that measure adverse response to the stressor of concern should be considered rather than an index such as an index of biological integrity (IBI)
- Appropriate selection of the acceptable effect level for the endpoint is critical for ensure protection consistent with Clean Water Act goals.
- Effects on invertebrates should be evaluated as well as effects on fish.

[http://yosemite.epa.gov/sab/sabproduct.nsf/B8765A5EC228792A852576150079D897/\\$File/Final](http://yosemite.epa.gov/sab/sabproduct.nsf/B8765A5EC228792A852576150079D897/$File/Final)

Note from Kenwyn George: It appears this link does not work. This one to the scheduled meeting worked for me, I then clicked on the first document listed under "Meeting Material" and the document came up:

<http://yosemite.epa.gov/sab/sabproduct.nsf/PeopleSearch/A436CC38C57967B58525759400609B09?OpenDocument>

As of 9/15/09 Bill had not heard how the Science Advisory Board review went.

Comment #5: The IBI Hughes paper/technique is usually set up for the area of concern with the relevant stressors, species etc. The Cascade/coastal mountain streams biota are not like Alaska streams. Macro invertebrates and fish should be looked at.

PacRim/Tetra Tech response: Tetra Tech is looking at transplanting the Hughes paper/technique to Alaska. They can look at invertebrates, but these are not shown in the study. They will also look at fish life stage; e.g. juveniles. Historically there is a fair amount of juvenile fish data.

Adjusting the manganese standard to reflect existing beneficial uses

PacRim/Tetra Tech response: Can a Human Health standard be changed? They understand from EPA that if levels are higher than water quality standards, then you do a Use Attainability Analysis; you do not change the standard. There is a need to look at the organoleptic effects and consumption. PacRim does have concerns about the use of mussels at Cook Inlet; they will look to see if there are any mussels upstream.

Comment #1: Mollusks in Cook Inlet, where tidal current can reach 10 knots, are not considered suitable for determining acceptable manganese levels in the Chuitna river system. Maybe put bags of mussels upstream? However, this will not work if the mussels need to be in an estuarine environment.

Comment #2: There are manganese standards for aquatic life that are used by other states. These criteria should be considered for compliance such that there are no discharges that allow toxics in toxic amounts. Also see the NOAA SquiRT tables for acute & chronic manganese values.

Other items discussed or comments received post- teleconference:

The maps are too small and information cannot be read off them. There needs to be maps at a readable scale, showing watersheds and sub-basins.

7Q10 flows for the three rivers should be provided.

River flow data should be presented to show flow fluctuations, including duration of flow events, such as low flows.

The river flow at the time of data collection should be provided.

Provide a background discussion on the purpose for conducting past water quality monitoring and a basis for the site location and of why the particular sites were chosen

The agencies need to have a person or people who are familiar with the area and monitoring sites to assist in determining whether the use of Site C141 will suffice for WER determinations on the other watersheds.

DEC vs. EPA roles: DEC proposes the SSC as a regulation for adoption. When approved by the state the ~~adopted proposed~~ regulation then goes to EPA for approval. During the EPA review process they will ~~communicate with the FWS.~~ ~~They will~~ also conduct an EFH analysis and ~~they have a responsibility to~~ see if any ~~thing species are is~~ impacted under the ESA. Beluga whales are downstream of the river system. ~~If -however-~~ EPA ~~can~~ determined that there is no impact to the whales, ~~in which case~~ consultation over impact to Beluga whales ~~will-would~~ not be required.

EIS and permits: If the SSC are approved, then the EIS will look at impacts with and without SSC. If SSC are approved, then they will be incorporated into the determination of appropriate ~~permit~~ limits.

Recalculation and WER: Since both these approaches are being used to establish SSC, recalculation should be done prior to WER, such that the correct species can be analyzed under the WER.

Comments from William Beckwith 9/15/09

Aluminum

Commented [b4]: I suggest this edit because establishing criteria, be they site-specific or statewide, is separate from permit limit development. Other factors such as technology based effluent limitations, antibacksliding (though not in the case of first time limits), antidegradation, the need to also meet criteria applicable downstream of a site, total maximum daily loads/wasteload allocations, and ESA considerations can affect the permit limits.

The aluminum aquatic life chronic criterion was lowered to protect two important species, brook trout and striped bass, which is a step beyond the initial criterion calculation and is provided for in EPA's 1985 guidelines for criteria development (Stephan et al 1985). The proposed study plan discussion of the aluminum chronic criterion does not seem to recognize this step, implying that derivation of the aluminum chronic criterion was inconsistent with the guidelines (study plan section 2.2, pages 8-9).

The proposed study plan includes a stated intent that the WER laboratory water toxicity tests for aluminum will be conducted at pH 6.5-6.6 and a hardness of approximately 12 mg/l, to simulate the characteristics of the solutions in the studies upon which Alaska's chronic aluminum criterion is based (Section 5.9, page 25). Water quality data presented in the proposed study plan shows that pH in the Chuitna Basin is also below 7.0 at times (with values as low as 6.4-6.5 reported), and that hardness is often at or below 10 mg/l (Tables 2 through 7 and Table A1). Based on the information presented to date, it maybe important to ensure that WER site water toxicity tests are conducted at such conditions as well. With this in mind, it would be useful to know if pH is expected to drift during the tests, and if so, how testing at a desired pH will be controlled.

There was a comment made during the 9/10/09 discussion with the applicant that may have implied to some that reducing "n" in the recalculation procedure ensures a conservative criterion. Reducing the number of genus mean acute values (GMAVs) in the national data set for a metal (i.e., reducing the value of "n") without changing (increasing) any of the lowest four GMAVs will result in a comparatively lower criterion value. However, reducing "n" is not necessarily a conservative offset for increases in the lowest four GMAVs.

It would be appropriate to further clarify the metals analysis to be conducted on the toxicity test solutions. It remains unclear in the revised study plan if adequate measurements will be made to verify the dissolved metals concentrations through the tests.

In its WER guidance, EPA generally suggests that ambient site water samples affected by recent storm water run-off that might elevate suspended solids and organic matter not be used (this said, snow melt conditions, though not necessarily snow melt conditions driven by a storm event, are discussed in the 1994 guidance as a potential concern due to the possibility that associated reduced hardness, pH, and alkalinity might cause the toxicity of a metal to increase at an amount-rate-greater than is offset by increased stream flow and dilution of the metal). During the discussion on 9/10, the applicant seemed to imply that a storm-event influenced stream condition would be targeted for sampling/WER analysis. This further heightens the importance of reviewing the WER test results and accompanying water quality data before determining how a final WER will be calculated from a set of WERs. It would not be appropriate to commit to use of a geometric mean of three WERs.

EPA has commented that following WER analysis toxicity tests should be conducted in site water with each metal at its proposed site-specific criterion ("mixed metal" tests). In response, the applicant is correct that such testing is not used by EPA in establishing its national criteria guidance. Such testing is,

Commented [b5]: I had written "rate," but believe "ammout" is more appropriate.

however, part of EPA's 1994 WER guidance for site-specific criteria development. Standard EPA test durations should be used, not the abbreviated durations suggested by the applicant.

Related to the Science Advisory Board review of the draft "Empirical Approaches for Nutrient Criteria Derivation" mentioned in Bill's email of 9/9/09, the text of which is provided earlier in this document, the following points have also been made for criteria development:

- One or more individual endpoints that measure adverse response to the stressor of concern should be considered rather than an index such as an index of biological integrity (IBI).
- Appropriate selection of the acceptable effect level for the endpoint is critical to ensure protection consistent with Clean Water Act goals.
- Effects on invertebrates should be evaluated as well as effects on fish.